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ABSTRACT

Faculties in schools of education are challenged to prepare educators for a changing world. In Canada, a growing number of educators are proactive in the face of a networked world. SchoolNet and its educational partners have been instrumental in articulating the possibilities that lie ahead. The individual's need to learn must be met in considerate and meaningful ways. In response to the growing needs for learning and the changing worlds of education, schools of education are working on a converging, vigorous action-research program, based around the TeleLearning Professional Development School (TL.PDS). Three key goals of TL.PDS are presented (with associated practices and findings for each goal): (1) making the discourse on learning and the knowledge about learning more public to sustain a knowledge-based society; (2) developing new knowledge of how telelearning technologies can support sustainable communities of learners; (3) extending opportunities for the professional development of educators through Web-extended institutes and practice. (AEF)

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Networked Learning Communities in Teacher Education

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Faculties in schools of education are challenged to prepare educators for a changing world. The world of learning is changing and there are numerous possible scenarios for the future of education. In Canada, a growing number of educators are proactive in the face of a networked world. SchoolNet (http://www.schoolnet.ca) and its educational partners have been instrumental in articulating the possibilities that lie ahead. Learning and learning systems may also move in a number of possible directions.

SchoolNet's Vision of learners (SchoolNet, 1996) presents key aspects of the preferred future of education and this vision can be assessed in terms of some of the following major alternatives:

Business as Usual. We continue going as we are, relying on our existing assumptions, structures and labour-intensive ways of teaching and learning. Attempts continue to integrate technology into existing structures. Resources are limited and in many places decline, affecting learning quality and public confidence. Competition among schools and school systems intensifies. Is this approach serving individuals and society well at the present time? Can we provide quality learning services with the resources available? Are we missing opportunities to make creative use of the new technologies?

The Funnel. The range of employment opportunities narrows as technology and global competitiveness limit the job market to low-level service skills needing little education and high-level technical and managerial skills based on post-secondary certification. For most of the population, a rewarding job is a scarce resource with few winners and many losers. What happens to the link between learning and career? What kind of learning is needed for those outside the job funnel? Can learning enlarge the funnel? Do we need new definitions of work and job?

Competing Systems. There is growing political conflict and economic competition for clients and funding; between the present education establishment and the virtual learning system of communications and information technologies in which teachers and institutions are of minor importance. Is such a conflict inevitable, built into the nature of competing philosophies? Is it helpful or dangerous?

In contrast, our preferred vision, as expressed in SchoolNet's Vision of learners, is one in which the need for all to learn is embraced and translated into a converging, vigorous action-research program. In this program, the new requirements for knowledge of technology is a key driver and a key enabler.

Cultivating the Need to Learn

The individual's need to learn must be met in considerate and meaningful ways. The necessity to improve our pedagogies is there, and part of the pressure is coming from young learners who are "growing up digital"(Tapscott, 1997). Moreover, too many children leave high school with a lesser desire to learn than when they entered. This is unacceptable for any nation wanting to evolve as a democracy, be part of the new global economy, and have its quality of life benefit from technological developments.

Higher expectations for all is also a reality in the realm of education worldwide (see UNESCO, 1996; OECD, 1997). Countries which foresee an economy where half of all new jobs created will require a university degree, must move away from associating high school schooling with social selection. Though it is voiced that without a high school diploma, individuals' futures will be greatly reduced, educational systems are slow to transform themselves in such ways as to offer more engaging learning activities and provide more flexible learning. As educational systems decentralize — a major worldwide trend — there are educators and communities who understand that the education of all children (and adolescents) is now both a moral and an economic imperative. However, classroom interaction is very timidly looked at as the essential core that could make the difference if adequately transformed. Our main research assumption, as we foster networked communities in our work as educators of educators, is that it is the interaction between the learner and knowledge, scaffolded by the teacher, that is the most critical one.

School and classroom organizations have been modeled to serve an industrial era that now belongs to the past. The hidden curriculum has been to prepare obedient, conformist, and competitive individuals, and classroom interaction has successfully been directed to these ends. Today's technology, educational research and social expectations now call, and support, the move of educators and communities whose purpose for schooling children is

to foster their intellectual capacities and creativity in many diverse ways and at higher levels, and who are willing to monitor, and temper, their own need for control to the benefit of learners' acquisition of autonomy and capacity for collaboration.

The New Requirements for Knowledge of Technology in Education: A Key Driver and a Key Enabler

In the context of our schools, the need for professional development is realized by teachers most directly in relation to information and communication technologies. The goal of integrating these technologies is at the same time creating a requirement for new knowledge, as well as creating new opportunities for cultivating knowledge. More and more educators understand that current requirements for technology in schools are markedly distinct from earlier attempts to import computers into the classroom by fostering specialists and leaders who form a minority of highly knowledgeable individuals. Today, the achievement of a better distribution of the knowledge is a growing imperative. One identified means to achieve this coverage is the initiation of learning communities formed mainly (but not exclusively) of teachers and student-teachers. This need for a more collectively oriented approach to knowledge is illustrated in Figure 1 on the vertical axis. This dimension complements the "Type of Participant" dimension in Mergendoller, Jonhston, Rockman, and Willis, (1994).

Figure 1 also illustrates another dimension that characterizes the new requirement for knowledge of technology: the need to use technology within a transformative vision of learning, to support with technology the new learning that could barely take place before, for example, the advent of networked computers. This tension between reproduction and transformation, illustrated in Figure 1, on the horizontal axis, corresponds to the contrast between a "focus within," to adjust the current system, and a "leap out" from the boundaries of our existing systems (Banathy, 1994).

An important aspect of the conversations we are having within our professional development activities is to qualify the major components represented in Figure 1:

- Ownership of knowledge: in what ways can we characterize the relationship to knowledge in our different settings; what does a collective ownership mean with regard to knowledge of technology; through what processes can experts in the school setting (including students) become better able to share their knowledge?
- Vision of learning and technology: what are the characteristics of profound uses of technology; what is exemplary use of technology in support of learning; what types of transformations do we expect to see as a result of exemplary use of technology?
- How can we characterize different communities in terms of the four quadrants in the figure (A, B, C, and D); and how can we characterize professional development in terms of movements across the quadrants (e.g., from A to C, and from C to D)?

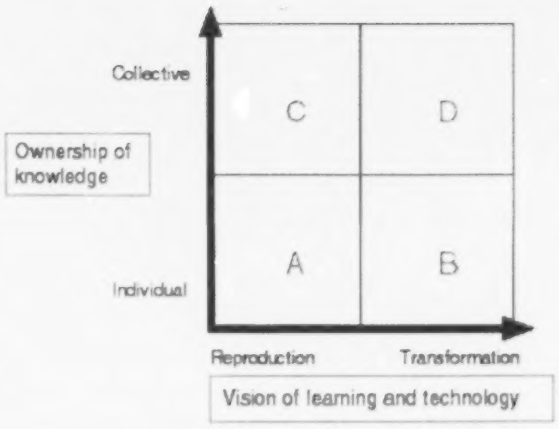

Figure 1. Dimensions of TeleLearning Professional Development.

Schools Of Education's Response

In response to the growing needs for learning and the changing worlds of education, our schools of education are working on a converging, vigorous action-research program, based around the TeleLearning Professional Development School (TL•PDS). We present three key goals of our TL•PDS (with associated practices and findings for each goal):

- making the discourse on learning and the knowledge about learning more public to sustain a knowledge-based society;
- developing new knowledge of how telelearning technologies can support sustainable communities of learners;
- extending opportunities for the professional development of educators through Web-extended institutes and practica.

To act responsibly in the face of the uncertainties mentioned above means asking ourselves what kind of learning environments should be designed for children and adults to learn and grow. As educators of educators, we know, for instance, that we need to immerse future educators in powerful learning experiences that lead to the development of generative, adaptive, and robust knowledge. These learning experiences need to be embedded in rich, authentic contexts such as intensive practica, face-to-face encounters and seminars. The cultivation of knowledge is best achieved through a process of conversations and reflection.

One promising response from schools of education in recent years has been the articulation of closer collaboration between universities and schools through "professional development schools" (PDSs). The PDS model, as

implemented at numerous sites, has been well formulated in the recent Draft Standards of the National Council for the Accreditation of Teacher Education (NCATE, 1997a). We are expanding the PDS model into the TeleLearning PDS described below.

The TL • PDS

The TeleLearning Professional Development School is a multi-site network of Faculties of Education (Laval, McGill, Oise/UT, and University of British Columbia) with their connected associated schools. It is a research activity of the TeleLearning Network of Centres of Excellence, funded in September 1995 through the Social Science Research Council of Canada. As faculty members of McGill University and Laval University, we are contributing to building new models of professional development and teacher education that are required today to address the new needs for technology knowledge and use of technology of practicing and graduating school teachers.

Establishing communities of learners around the teaching professional and student-teachersupported by networked computers is one major component of the new model we are designing. As we implement this model, within each learning community, high school learners, student-teachers, school-based and university-based teachers are interacting in increasingly differentiated ways. As in other communities of learners (Brown, 1997), we base our design on agency, reflection, collaboration, and culture.

Within our research network, the design of such communities is seen as critical. At each setting, this community, based in a school or group of schools, sharing a vision of school learning and teaching, establishes for itself goals as well as instruments to acquire and share the knowledge required for the achievement of their goals. In this context, we are facing a larger and more and more differentiated number of learners (the entire school staff, the parents, the students, etc.), and we need to consider effective learning mechanisms to handle this demand. We have to establish a community of learners that will be able, to the largest extent possible, to handle its own learning needs and to build capacity for the school to adapt and grow.

The TL•PDS is a construct anchored in two major realities: the physical PDS (professional development schools where there is substantial use of technology for teaching and learning) and the virtual PDW (professional development webs constructed at each site, using various telelearning tools (such as the WWW and online discussion forums), linked to one another, and which support and reflect the activities occurring in the PDSs). Two official languages are spoken in the TL•PDS, English and French.

To establish networked learning communities in teacher education that help shape emerging practices is a work of design fostered and documented through our research activities. It is, in the words of Banathy (1994), a "future-creating disciplined inquiry."

The Telelearning Professional Development Web

The task of helping student-teachers learn new pedagogies for instructional purposes in a rapidly changing social context is supported by Virtual U. Built on ten years of research (Harasim, 1997), Virtual U is a Web site with authorized access, a powerful conferencing system, internal search engine, learner workbenches, and more. This telelearning environment currently supports teachers' collaborative reflective practice (pre-active, interactive, and post-active phases) and knowledge-building, thus addressing complex questions and perplexing dilemmas inherent in daily practice. Online discussions about curriculum and pedagogy (PDW) merge with face-to-face conversations (PDS) to contribute to the learning experience of the student-teachers who participate in the program.

The anonymity of the student-teachers, teachers, and teacher educators is protected, and the sitds opened to others who want to explore the benefits, on a voluntary basis, of the resources of this learning place. Ways of fostering and managing these virtual communities of practice are progressively uncovered.

Making Public the Discourse and Knowledge of Learning

A first important objective of our TL•PDS is to make the discourse on learning and the knowledge about learning more public. The need for greater awareness of learning, and of ways of knowing and talking about learning, is another requirement of a sustainable knowledge-based society. The American Psychological Association's Learner-centered psychological principles (1995) have been found instrumental in this respect. In order to build our knowledge society, we need to allow more people to talk in more sophisticated ways about learning.

The TL•PDS uses telelearning tools in order to achieve this objective. Local Web sites are found informative by student-teachers and educators. Student-teachers, cooperating teachers, and teacher educators participate in online discussion forums. The discourse that is created in this context is useful in achieving resolution on key challenges that educators face in their practice. The discourse also has interesting additional properties: because it is online and written, there is the creation of a social text that is inspectable. This text, in turn, becomes the object of sharing and shaping of knowledge about learning.

To illustrate, there are, this semester, at Laval University, over 15 discussion forums related to four student-teacher cohorts (15 students per cohort, 3 cooperative teachers, and 3 university-based teachers). Three student-teachers are involved dailyin a high school which is implementing a program, PROTIC (Programme PRO

Technologies de l'Information et des Communications), now involving 62 children, all receiving laptop computers, which foster project-based learning. Twelve other student-teachers visit the school once a week. Others are "virtually" connected through either their discussion forums and/or the Web site.

Topics and Learning Scenarios. In this PDW, the education of reflective teachers for elementary and secondary schools, ones who will understand the use of telelearning technologies for high-level learning tasks is the problem at hand. Subtasks are identified, and gravitate around the three moments of the teaching act (pre-action, inter-action, and post-action). Planning, implementation, and evaluation tasks have their own components, and these are more often than not left to the initiative of each individual or team.

The discussions have centered around the following scenarios and learning issues:

Participant observation. Student-teachers 1) observe classroom interaction and/or participate in the ongoing learning activity; 2) present a descriptive statement and comments on a particular element of the observed educational situation within a VGroup (Virtual U); 3) construct, later in the semester, reflective statements using one another's first-hand journal excerpts.

Deliberative role learning. Student-teachers acquire knowledge in changing social expectations and explore the evolving roles of teachers and learners in telelearning environments. As their personal values, learning styles and habits are at times confronted by newly emerging pedagogical practices, some value conflict resolution must be found, and face-to-face meetings are most instrumental in this respect. Online discussions contribute to the uncovering of new possibilities for learning and teaching.

Professional development planning. Student-teachers are using a VGroup to plan for future professional development that will unfold during their induction years in the teaching profession. Plans include ways to learn to integrate telelearning technologies, and to stay connected to the professional development Web.

Collaborative reflective practice. Teachers share their understanding of specific learning situations, and find ways to improve future action. At first, patterns of connection reflect local activities and research preoccupations. As common understanding and opportunities for collaboration grow, more cooperation, coordination, and integration occur. These patterns parallel Banathy's four phases (1991).

Knowing How to Support Sustainable Communities of Learners

The TL•PDS is developing new knowledge of how telelearning technologies can support sustainable communities of learners. Knowledge grows out of the interactions taking place in this virtual community, and of reflective practice. Because each site is developing its own Web site (Tact, Csile, Studio A, McGill TK), each offers a unique and context-based perspective on the integration of ICTs (Information and Communication Technologies) in learning environments. The building of interactive capacities within and across sites is seen as highly relevant by the teacher educators and researchers. They aim at assisting preservice and inservice teachers while gaining knowledge and skills of a practical or intellectual nature which they are called upon to master, in order to accomplish the tasks and functions expected of them now or in the not too distant future.

Our willingness to use telelearning technologies in such ways as to contribute to the creation of functional and collaborative communities of practice has led to the following practices:

- at the process level, patterns of connection (between high school learners, student-teachers, teachers, and teacher educators) were examined, using principles of discourse analysis, and used to guide further steps in the design of the TL•PDS;
- at the content level, bi-polar themes have been identified, including public-private, school-work learning and tradition-innovation. Student-teachers' concerns for classroom management issues are crossed by these different tensions.

Preliminary examination of our data reveals important patterns of conceptual change triggered by participating in a networked community: changes concerning the conception of the learner, of the teacher, and of the modes of interacting with knowledge objects. Another important finding concerns the high inter-dependency between these changes: certain re-conceptualizations of the teacher's work are possible only from a re-conceptualization of the role of the learner, and of the relationships between the learner and various knowledge objects. For example, building groups of active learners supported by potent technologies create powerful opportunities for teachers to participate in professional communities.

Our experiences also inform us of the important role of the online discussion facilitator. One major aspect of this role is to help participants negotiate their transitions between physical and virtual worlds. In order to maximize the level and quality of participation, it now seems useful to use "transitional objects:" symbolic objects that can be present or even produced in face-to-face situations and then digitized, with opportunities for further manipulation and sharing in the virtual group. For example, the concept maps produced in a seminar meeting using physical transparencies and markers, discussed during the meeting, can be posted on the seminar Web space for further reference. The concept map then becomes a symbolic object that helps participants relate their work from the physical onto the virtual.

To facilitate participation in virtual groups, two other important conditions have been identified: the clarity and centrality of expectations to participate, and the specification of complementary roles and responsibilities. For teachers and students to participate in online discussions, these discussions must be set as an integral part of meaningful learning activities. It must be clear that all are expected to participate, and that participation is fully valued. Situations where the online discussion is an add-on do not generate productive work. Similarly, the complementary roles and responsibilities allow individuals to focus on a certain layer of conversation, while keeping the whole discussion in mind. By including responsibilities to report from other discussions, different sub-groups can maintain a coherent picture of a conversation that would not be manageable otherwise (for instance, in the case of forums reaching 600 kilobytes over a four-week period).

Resources and Assistance. The TACT Web site (with its electronic materials and links to materials on other Web sites), collaborative spaces such as V-Groups, Web-CSILE databases, CD-ROMs, videotapes, conceptual maps and representations provide computer-supported collaborative learning environments to student-teachers and teachers. E-mail and the exchange of files remain basic ways of communication, but our collaboration is increasingly supported by V-Groups (Virtual U). Once a statement or a question has been written, students are eager for a response. Ways of managing the increased expectations for social interaction must be found.

Simulations as such are not used per se, but evocative examples are. More experienced participants help less experienced ones. Sometimes, a student has learned something only a few months, weeks, hours, or minutes earlier, and is asked to guide a newcomer in a particular task. Coaching on the part of the instructor is key, including technical assistance at times. It must be stressed that the use of telelearning technologies acts as a catalyst for the transformation of the role of the traditional teacher. Modeling is key, and entails the roles of teacher facilitator, coach, mentor, guide, mediator, project manager, and director of learning (for additional information on teacher beliefs and practices with these technologies see: http://www.education.mcgill.ca/fedwww/cils/Telelearning/Telelearn.html

The sharing and shaping of experiences in ways facilitated by the increased information, communication, and collaboration powers of new technologies are becoming more and more obvious. Collaborative teaching is in sight. The main focus is on the knowledge teachers use in the process of implementing information and communication technologies in their teaching.

Web-Extended Professional Development for Educators

The third main goal of the TL•PDS is to provide extended professional development opportunities to educators (including practicing teachers, student-teachers, and teacher educators) through establishing regular learning activities, Web-extended institutes and practica.

Our design of TL•PDS, and the discussions taking place within and between each site, reveals the challenge of sustainability in establishing learning communities in teacher education. We treat this challenge in terms of requirements to embed activities that survive single teacher-development events and that will become part of the school and/or university ethos. Examples of such activities are e-mail discussions, team work on curriculum innovation with technology, lunch-time project sharing, and various celebrations.

Another example of the ways in which it is possible to provide extended professional development for educators is our current design of TeleLearning Institutes. The first of these Institutes is planned to occur with the McGill Faculty of Education in August 1998. The essential components of the Institute are the objectives, the theme, and the process we are designing to ensure that the Institute is coherent with established long-term relationships. The objectives of the Institute are to allow participants to:

- learn to use ICT in support of student-learning;
- create resources that will be useful in teaching and learning current curricula;
- plan the school Web site and prepare continuous work to maintain it;
- establish and deepen collaborative working and learning relationships with colleagues both online and face-to-face;
- discover ways of using technology to collect, interpret, and share portfolios of student learning.

The theme of the Institute is "The Web site as a strategic project for the school." Around this theme, participants will work on the establishment of learning resources and student-centered projects on the school Web. In order to ensure that the Institute is coherent with established and long-term relationships, we are inviting teams of teachers and administrators from our PDSs to join teams of student-teachers and faculty members. Members of teams at the Institute will work together to share information and to connect their resources.

School-based teams of teachers (possibly with school administrators) will be working during the Institute on the initial design of their school home page, or on improving the existing design. They will identify specific accountability measures to evaluate the success of their Web design (for example, in terms of the capacity of students to achieve higher learning goals). Each school team will be matched with a team from the Faculty of Education composed of one

faculty member and two to three student-teachers who will be doing their practica at the school. The Faculty team is learning in this context also, through peer coaching across the different professional roles within a team. During the Institute, telelearning faculty members will offer support and will lead workshops, either in face-to-face or virtual situations. Teams will develop relationships in face-to-face contexts, and they will plan ways of continuing these relationships online through e-mail, joint Web design, and discussion forums. As such, the work of student-teachers in the school becomes a continuation of relationships and previous conversations. Activities prior to and following the Institute will ensure that the Institute is embedded within on-going practices at the school and the Faculty. For example, a site-based McGill course on "Integrating technology in the classroom" is offered to schools where a group of teachers (in some cases with students and parents) wants to meet regularly to develop new knowledge and skills in this area. We foresee PDWs becoming another key activity, in addition to courses, seminars, and practica, for universities' professional schools.

Conclusion

The social and cognitive circumstances that seem to be required for successful networked learning communities in teacher education - as those mentioned above - are still at an early stage of conceptualization. Networked learning and teaching is indeed a whole new practice, one likely to gain greater relevance while the demand for education keeps increasing as we move in the Knowledge Age. The initiatives described in this paper are part of our "local" endeavor to design a "teacher education culture that promotes curriculum experimentation, collaborative learning, faculty development, and better linkages to P-12 schools" (NCATE, 1997b). Our approach is to start with a critical mass of participants, and then to celebrate and publicize success (Mergendoller, Johnston, Rockman, & Willis, 1994).

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Web Sites

TL-NCE : CSILE *TeleLearning Network of Centres of Excellence: Computer-Supported Intentional Learning Environments* URL: http://csile.oise.utoronto.ca

TL-NCE: Studio A.*TeleLearning Network of Centres of Excellence: Studio A.* URL: http://www.knowarch.com

TL-NCE: TACT.*TeleLearning Network of Centres of Excellence: Télé-apprentissage communautaire et transformatif/Technology for the Advancement of Collaborative Teaching and Training.* URL: http://www.tact.fse.ulaval.ca/

TL-NCE: MCGILL TK.*TeleLearning Network of Centres of Excellence: Teacher Knowledge and Skill for Effective Implementation of Learning.*
URL: http://www.education.mcgill.ca/fedwww/cils/Telelearning/Telelearn.html

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